

## **PART 4 – AROMA CHEMICALS DERIVED FROM ESSENTIAL OILS**

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### **3 ESSENTIAL OIL INDUSTRY AND MARKET ANALYSIS**

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#### **3.1 International Market – Overview**

There are well over 160 recognised essential oil crops but most are of minor importance in terms of worldwide demand. The top ten crops by volume account for about 80% of the total world market for essential oils.<sup>22</sup> The remaining 20% of the world essential oil market comprises over 150 crops. The largest of the internationally traded essential oils are set out in the table below:

**Table 5: The World's top 20 Essential Oils<sup>23</sup>**

<b>Essential Oil</b>	<b>Volume (t)</b>	<b>Value (\$ mill)</b>
Orange	26,000	58.5
Cornmint	4,300	34.3
Eucalyptus cineole-type	4,300	29.8
Citronella	2,830	10.8
Peppermint	2,367	21.6
Lemon	2,158	21.6
Eucalyptus Citronellal-type	2,092	7.3
Clove Leaf	1,915	7.7
Litsea Cubeba	1,005	4
Sassafras (Brazil)	1,000	4
Lime Distilled	973	7.3
Native Spearmint	851	17
Cedarwood (Chinese)	800	3.2
Lavandin	768	6.1
Sassafras (Chinese)	750	3.0
Camphor	725	3.6
Coriander	710	49.7
Grapefruit	694	13.9
Patchouli	563	6.78
<b>TOTAL</b>	<b>88 769 tonnes</b>	<b>\$340 mill</b>

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<sup>22</sup> Agricultural Note AG0656: Dept of Primary Industries/ Dept of Sustainability and Environment Australia

<sup>23</sup> Brian A. Lawrence, 1993: A planning scheme to evaluate new aromatic plants for the flavour and fragrance industry

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The major exporters of essential oils are the United States (US), the European Union (EU) and a number of developing countries, the most important of which are China, Indonesia, India and Brazil. In 1998 the EU accounted for 52 per cent of the value of world exports, and the US 13 per cent (UN 1999). Developed countries are the main importers of essential oils, with the EU and the US accounting for 44 per cent and 8 per cent respectively in 1998 (UN 1999).

The major consumers are the US (40%), Western Europe (30%) and Japan (7%).

The major essential oil world crops are: citrus (US, Brazil, Mexico); mint oils such as peppermint (US), spearmint (US) and cornmint (China, India, South America); and lemon fragrance oils such as citronella, lemongrass and *Listsea Cubeba* (China, India, South America). Eucalyptus oil is produced in Brazil, China and South Africa, as well as in Australia. Cedarwood oil is confined to North America as a by-product of the timber industry. The clove industry is confined to Indonesia.

The major producers of essential oils are Brazil, China, US, Egypt, India, Mexico, Guatemala and Indonesia. All of them, with the exception of US, are developing countries with very low labour costs. The US is prominent in respect of crops that are highly mechanised, such as peppermint.

Over the last 50 years, the demand for essential oil products has gradually increased because of a number of factors. Demand for flavouring, perfumery, and aromatherapy materials has risen because of the steep rise in the world population and the emergence of new middle-class societies, particularly in the east. Furthermore, there is an increased demand, by the people of the industrialized countries, for greater variety in their food and a trend towards health and wellness. The increased concern for the environment and for the safety of food has also contributed to the continued growth in demand for naturally derived flavour and fragrance products (such as essential oils).

The United Nations International Trade Yearbook<sup>24</sup> indicates that trade in essential oils is growing at a rate of approximately 10% per annum. In 1998, world exports of essential oils and related perfumes and flavours were valued at US\$ 7 435 million and imports at US\$ 6 811 million (UN 1999). Table 2 shows that the value of world trade has increased substantially between 1986 and 1998.

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<sup>24</sup> United Nations International Trade Yearbook 1999 and 2002

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**Table 6: World trade in essential oils and related perfumes and flavours<sup>25</sup>**

	<b>1986</b>	<b>1990</b>	<b>1994</b>	<b>1998</b>	<b>1986–98</b>
	US\$m	US\$m	US\$m	US\$m	% pa
Exports	2 149	4 122	5 051	7 435	10.9
Imports	2 008	4 206	4 802	6 811	10.7

These world export and import figures may be misleading as it includes double accounting (imported goods re-exported with or without beneficiation) and a wider range of products than just essential oils. For example, in 1993, industry expert Brian Lawrence estimated the world production of essential oils to be some 56,000 tons with a value of some US\$ 500 million, whereas the world export and import figure for 1994 was US\$ 5051million and US\$ 4802 million respectively. The value of production of essential oils is approximately 10% of the value of international trade in essential oils and related products as measured by the United Nations Trade Statistics. It is estimated that the world production of essential oils in 2003 was approximately 130 000 tons with a value of approximately US\$ 1 billion<sup>26</sup>. This is in line with the growth rate of 10% year on year, experienced since the 1980's.

Some 50% of the world production of essential oils is used in flavours (predominantly beverages), a further 5% to 10% in phytotherapy and aromatherapy, 20% to 25% in fragrances and 20% to 25% is used for further fractionation for the isolation of aroma chemicals. Within the fragrance category, 70% is used in household products, with another 20% used in toiletries and personal care items and the remaining 10% used in fine fragrances (perfumes).

### **3.2 South African Market – Overview**

South Africa has a well-developed chemical and consumer products manufacturing industry which has a demand for fragrances (mostly synthetic aroma chemicals) and has a well developed food processing industry demanding flavours.

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<sup>25</sup> Source: United Nations International Trade Yearbook 1999

<sup>26</sup> Industry Sources

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According to industry sources, the South African flavour and fragrance industry was worth approximately R900 million in 2003. Approximately, two thirds of the market is for flavours and the remainder for fragrances.

On the whole, synthetic aroma chemicals and natural formulations are mostly imported into South Africa through branches of the large flavour and fragrance houses. To the extent that local manufacturers of end products are themselves international companies or are manufacturing under licence to international companies, these companies source the majority of their chemicals through the same flavour and fragrance houses as their international principals do. Accordingly, the local market in South African essential oils is relatively small (with the exception of eucalyptus and citrus oils) and South Africa is a net exporter of essential oils.<sup>27</sup> Local exports of essential oils are approximately R100 million per annum and local imports of essential oils are approximately R40 million per annum.<sup>28</sup>

From a production or supply perspective, the South African essential oil industry has two main components: firstly, the cultivation of “classic” or exotic essential oils and, secondly, the harvesting or cultivation of indigenous essential oils (which, besides Buchu oil, is commercially much less significant). With regards to the classic essential oils, these may be viewed in two parts. The first are the major bulk commodity oils, such as eucalyptus and citrus oils, for which South Africa is already an acknowledged world producer. Secondly, there are the smaller niche minor essential oils (world market of less than 500 tons per annum) which include: Geranium, Lavender, Chamomile, Rosemary, Jasmine, Basil, Melissa, Marjoram and Thyme.

The current South African production of essential oils is approximately 2100 to 2900 tons per annum. Production has been on the increase in the last five years.

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<sup>27</sup> DTI Export Import figures (2002)

<sup>28</sup> SARS (Customs & Excise)

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**Table 7: Estimated South African Production (2003)<sup>29</sup>**

<b>Essential Oil Type</b>	<b>Volumes (p.a.)</b>
<b>Major Oils</b>	
Orange	300-500 tons
Lemon	200-500 tons
Lime	1400- 1600 tons
Eucalyptus (cineole type)	200- 300 tons
<b>Minor Oils</b>	
Rose Geranium	3000 kg
Lavender /Lavandin	2000kg
Jasmine	2000-3000kg
Rosemary	400-600kg
Chamomile	30-40 kg
Tagetes	6000 -7000kg
Buchu	500-1000kg
Artemesia	500-800kg
<b>TOTAL</b>	<b>2100 -2900 tons</b>

With regards to unique indigenous essential oils, South Africa has several species which have obtained international acceptance and many that have not. South African indigenous plants which are being cultivated or harvested in the wild for their essential oils include: Buchu, Artemesia and Tagettes (the latter, although not originally indigenous is now endemic). Not all of these are used in the flavour and fragrance industries, for example Buchu is also used in medicinal preparations. Other uniquely South African offerings include Cape Chamomile, Cape May Oil and Cape Snow Bush. These and other products are largely exported in a few kilograms per annum to speciality buyers in US and Europe.

However, the potential for the commercial exploitation of South African flora may be significant. The world flavour and fragrance industry is driven by novelty and the international F&F houses, like Givaudan, send out fragrance and flavour hunters worldwide. The Givaudan groups are called "Scenttrek" or "TasteTrek"<sup>5</sup> (depending on focus), and they have travelled to countries such as French Guyana, Gabon, Madagascar, Papua New Guinea and South Africa to investigate and take samples of indigenous flavours and

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<sup>29</sup> Industry Sources

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fragrances. It has been reported that Givaudan has “taken” some 20 new fragrances from South Africa alone over the last couple of years. This illustrates the potential as well as the threat posed by the industry.

There has been a lot of research that highlights that South Africa is considered to be a “hotspot” for biodiversity with more than 22,000 plant species occurring within its boundaries. This represents 10% of the world's plant species. However, it is especially the Flora Capensis that is most unique. This, the Cape Floral Kingdom, is the smallest of the world's six Floral Kingdoms. It contains 8,700 species of which 68% are endemic.<sup>30</sup> South African indigenous crops are used in a number of different applications, such as the trade in medicinal and cultural plants, food crops, and ornamental plants. Indigenous medicinal plants are used by more than 60% of South Africans in their health care needs or cultural practices, with approximately 3,000 species being used by an estimated 200,000 indigenous traditional healers.<sup>31</sup> It is this heritage which the CSIR (Bioprospecting Division) and others is attempting to unlock in a manner that will allow for the commercial exploitation of South Africa's natural resources. Using indigenous knowledge systems as the basis for plant identification and analysis, it is possible for scientific and commercial players to identify new entrants into the international flavour and fragrance market. However, as already stated, this initiative is more likely to succeed on the back of a flourishing conventional essential oil industry.

### **3.3 South African Market - General Comments**

The analysis of the local essential oils market is difficult because of the lack of quality information. The import and export figures kept by DTI and SARS (Customs & Excise) are generally not that informative. The figures more accurately deal with products such as Orange, Lemon, Lime, Geranium, Lavender, Jasmine and Peppermint, but do not deal with important products like Eucalyptus, Chamomile and Lemongrass. The latter products are “bundled” under the category “Other”. The “Other” category is relatively large. For 2003 the

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<sup>30</sup> Coetzee, C., E. Jethas, and E. Reinten. 1999. Indigenous plant genetic resources of South Africa. p. 160–163. In: J. Janick (ed.), *Perspectives on new crops and new uses*. ASHS Press, Alexandria, VA.

<sup>31</sup> Van Wyk, B-E., B. Van Oudtshoorn, and N. Gericke. 1997. *Medicinal plants of South Africa*. Briza Publ., South Africa.

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SARS figures for “Import- Other” was R13,26 million out of a total of R50 million and for “Export- Other” was R31 million out of a total of R110,3 million<sup>32</sup>.

Furthermore, the code for essential oils also includes concretes, resinoids, distillates and oleoresins. In the case of oleoresins, the contribution is significant (making up 22% of exports in 2003). Oleoresins are those extracts which include a mixture of essential oils and resins, the details of which products are not broken down.

When reviewing the South African essential oils import and export figures there are several features that may be observed.

The export figures are slightly inflated and do not reflect the level of production in South Africa. Conversely, the import figures do not reflect the level of consumption in South Africa. This is a common problem, even in developed markets, for example Britain exports much more than it produces because it imports for re- export. Therefore the size of the market appears inflated. This is also the case for South Africa, where South Africa often acts as a conduit for product into Sub-Saharan Africa. For example, in 2003, South Africa imported 4,333kg of Lavender oil and in turn re-exported approximately 1000kg to Sub-Saharan African countries.

In many cases South Africa imports and exports the same product. This is even the case where South Africa is an acknowledged world supplier. For example, South Africa is a major producer of orange and lemon essential oils (in 2003 exports of 287 tons and 197 tons respectively) however South Africa also imports orange and lemon essential oils (in 2003 imports of 58,7 tons and 6 tons respectively). This occurs largely for one of two reasons, either the essential oil needs to have particular characteristics which only pertain to the imported product or because there is an overriding market relationship between the overseas seller and the local buyer.

For the reasons stated above, it is also difficult to discern from the import and export figures what the local production and consumption of an essential oil is. One needs to compare the import and export figures to market intelligence gleaned from local producers.

The local production figures are currently difficult to obtain. There is very little sharing of information. Even the South Africa Essential Oil Producers Association (SAEOPA) (which has established new branches in Kwa-Zulu Natal and the Cape) has only been able to collect figures for the Mpumalanga area as the collection process is totally dependent on personal

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<sup>32</sup> SARS, Customs & Excise (2003)

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relationships. Figures also tend to be based on hectares under cultivation and not on actual kilograms or tons of oils distilled. Accordingly, local production figures gleaned by the consultant (see Table 7 above) are rough estimates only.

### **3.4 South African Market - Trade Partners**

The key producers of essential oils world-wide are mostly developing economies (e.g. India, China, Brazil, Indonesia, Mexico, Egypt and Morocco), with the key exception being USA (peppermint and other mints). It is estimated that 65% of the world production of essential oils is produced by developing countries. However, in respect of essential oils, South Africa imports mostly from US (32.9%), Britain (15.8%), France (10%), together with India (11%) and China (5%).

**Table 8: South African Essential Oil Trade Partners Imports 2003<sup>33</sup>**

<b>Country</b>	<b>Value (\$) Imports</b>	<b>Percentage</b>
United States	2,172,570	32.88
United Kingdom	1,042,720	15.78
India	782,784	11.85
France	714,076	10.81
China	329,859	4.99
Netherlands	279,663	4.23
Australia	174,909	2.65
Spain	174,699	2.64
Switzerland	125,022	1.89
Zimbabwe	113,228	1.71
Cuba	113,128	1.71
Germany	113,025	1.71
Italy	106,206	1.61
Indonesia	74,498	1.13
Malawi	48,563	0.73
Other	234,147	3.68
<b>TOTAL</b>	<b>6,608,097</b>	<b>100%</b>

<sup>33</sup> DTI Trade Figures 2003

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The above figures (Table 8) reflect at least two aspects of the market. Firstly, the developed world (particularly US and Europe) dominates the flavour and fragrance industry, in particular the formulation of compounds for end-use. The majority of the world's primary production is imported by US and Europe, beneficiated there and exported to the rest of the world. Secondly, countries tend to import commodities from their traditional trade partners.

With regards to South African exports, the figures (Table 9 below) illustrate how the economic periphery (developing nations) provides primary materials to the economic hubs (developed nations). There are two primary features of South African exports. The first is that the majority of produce goes to Europe (49%), US (24%) and Japan (4.5%). The second is that South Africa, in turn being a regional economic hub, plays a role in on-selling product to African markets (e.g. Zimbabwe, Zambia, Mozambique, Angola and the like – some 7% in 2003).

**Table 9: South African Essential Oil Trade Partners – Exports 2003<sup>34</sup>**

<b>Country</b>	<b>Value (\$) Exports</b>	<b>Percentage</b>
United States	3,659,458	24.6
Germany	2,031,685	13.65
France	1,605,341	10.79
United Kingdom	1,314,408	8.83
Spain	960,369	6.45
Netherlands	749,032	5.03
Japan	659,028	4.43
Switzerland	601,171	4.04
Canada	538,761	3.62
Australia	454,976	3.06
Angola	414,144	2.78
Zimbabwe	305,639	2.05
Belgium	206,479	1.39
Mozambique	198,820	1.34
Malawi	150,115	1.01
Other	1,029,318	6.92
<b>TOTAL</b>	<b>14,878,744</b>	<b>100%</b>

<sup>34</sup> DTI Trade Figures 2003

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### **3.5 South African Market - Overview for Specific Oils**

#### **General Comments**

Essential oils share a common value chain. However, each essential oil has its own particular dynamics. This depends on how and where it is produced (both nationally and internationally) and what its end uses are. In some instances it is clear where the oil is being sold (e.g. Eucalyptus, Citrus and Buchu). However because of the small quantities, it is difficult to track the sales of many of the South African essential oils as they are sold locally to small traders or into the growing aromatherapy market. Below are a series of market-related monographs on each of the essential oils currently commercially produced in South Africa.

#### **Orange**

Citrus oils are produced as a by-product of the citrus fruit and fresh fruit juice market. South Africa is a net exporter of orange oils (as it is of fresh fruit). Orange oils are usually cold pressed (and not steam distilled). The main producers are the fruit producing co-operatives: Associated Fruit Producers, Valor Co-Op, Granor Passi, Onderberg Verwerkings Co-Op, Magalies Co-Op and Letaba Co-Op. Recently, a well established producer (Dickon Hall) went out of business as a result of the down turn in the markets. A large portion of production is purchased by a local company, Teubes (Pty) Limited (Gauteng Province), for further processing and fractionation, the rest is exported. The citrus flavours generally are used in the softdrink and confectionary industries.

Internationally, the orange oil and limonene markets are dominated by a few big players. Brazil is the main competitor, producing 45% of the world's citrus oil, and has a strong effect on the market. South Africa supplies about 2% of world demand.

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**Table 10: South African Orange Oil Imports and Exports<sup>35</sup>**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	79,443	495,241
2000	175,513	531,230
2001	85,379	325,142
2002	58,498	504,031
2003	58,768	287,221

The price of orange oils has been steadily on the rise going from R4/kg in 1999 to R20/kg in 2003. The price is driven by the current shortage of orange oil on the international market. This is expected to change in the future as India is known to have established more orange plantations over the last few years. When these plantations come into production the price is expected to drop to about R8/kg.

### **Lemon**

Citrus oils are produced as a by-product of the citrus fruit and fresh fruit juice market. South Africa is a net exporter of lemon oils (as it is of fresh fruit). The main producers are Associated Fruit Producers, Valor Co-Op, Granor Passi, Onderberg Verwerkings Co-Op, Magalies Co-Op and Letaba Co-Op. A large portion of production is purchased by Teubes for further processing and fractionation, the rest is exported. The citrus flavours generally are used in the softdrink industry, for example, Coca Cola. Besides beverages and confectionery, Lemon oil is also used in fragrances, where it provides a “top” note.

**Table 11: South African Lemon oil Imports and Exports<sup>36</sup>**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	34,575	185,583
2000	76,868	181,740
2001	18,601	249,108
2002	7,982	506,882
2003	6,124	197,815

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<sup>35</sup> SARS (Customs & Excise)

<sup>36</sup> SARS (Customs & Excise)

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Although also a commodity, the prices for lemon oil are better than for orange and lime, but are relatively flat. Historically, Argentina upset the lemon market with over-production. Prices went to a twenty year low, dropping from \$12/kg to \$4/kg in 18 months. Producers of lemon oil currently budget for prices of R30/kg for the next few years. Local prices are currently between R35/kg and R40/kg. Lemon, like the other citrus oils, lends itself to rectification and further refinement. This is done in South Africa by Teubes. Five-fold lemon oil is sold for about R450/kg.

### **Lime**

Citrus oils are produced as a by-product of the citrus fruit and fresh fruit juice market. South Africa is a net exporter of lime oils (as it is of fresh fruit). The main producers are Associated Fruit Producers, Valor Co-Op, Granor Passi, Onderberg Verwerkings Co-Op, Magalies Co-Op and Letaba Co-Op. A large portion of production is purchased by Teubes for further processing and fractionation, the rest is exported. The citrus flavours generally are used in the softdrink industry.

**Table 12: South African Lime oil Imports and Exports<sup>37</sup>**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	9,395	45,105
2000	14,277	18,649,569
2001	5,998	711,005
2002	4,729	1,482,458
2003	1,602	1,686,768

The current price for lime oil is approximately 50 cents/kg. The price for lime oil was R38/kg in 1999. Even with exchange rate differentials, this demonstrates the cyclical and volatile nature of the commodity prices

### **Eucalyptus (Cineole-type)**

The species grown in South Africa since the 1950's is *Eucalyptus Smithi*. It is grown in the Eastern regions of Southern Africa (including Swaziland) from Kwa-Zulu Natal to Limpopo Province. This Eucalyptus produces a cineole-type oil. Cineole-type oil is predominantly

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<sup>37</sup> SARS (Customs & Excise) It is noted that the export figure for 2000 appears anomalous

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used in medicinal applications, but there are some flavour applications. The two principal perfumery oils are produced from *E. citriodora* and *E. staigeriana*.

The world production and trade in Eucalyptus oil is dominated by China. Because of lack of production figures and domestic consumption figures in producer countries, it is difficult to accurately quantify the world market. In 1991 it was estimated that China produced some 70% of the world's cineole-type oil.<sup>38</sup> In 2004 it is estimated that this has risen to between 90 and 95%. In 1991 it was estimated that South Africa produced between 150 to 180 tons of oil<sup>39</sup>. By 2002 this had risen to 300 tons<sup>40</sup>. This constitutes some 5 % of world production.

**Table 13: World Production and exports of Cineole-type Eucalyptus Oil 1991<sup>41</sup>**

<b>Country</b>	<b>Production (Tons)</b>	<b>Exports (Tons)</b>
China	1600-2000	1300-1500
Portugal	150-200	150
India	150 -200	-
South Africa	150 - 180	120
Australia	120 -150	100
Swaziland	80 -100	80
Chile	80-100	70
Spain	50 -100	50
<b>Total</b>	<b>2480-3130</b>	<b>1870 - 2070</b>

US and the EU are the largest importers of eucalyptus (some 400t and 1800t respectively in 1990). The current market price is approximately \$5.00/kg. Prices are continually under pressure as a result of the huge supply from China. Discussions with local producers indicate that at the current price levels and with the stronger Rand it is impossible to compete with the Chinese. Some of the larger producers have been able to turn from exports to supplying local markets, particularly for medicinal use. Larger South African producers produce in excess of 60 tons of oil per annum, but the average production per farmer is between 20 to 30 tons.

<sup>38</sup> "Processing, refinement and value addition of non-wood forest products" T de Silva and CK Atal, FOA

<sup>39</sup> "Processing, refinement and value addition of non-wood forest products" T de Silva and CK Atal, FOA

<sup>40</sup> DTI Export Figures (2002)

<sup>41</sup> "Processing, refinement and value addition of non-wood forest products" T de Silva and CK Atal, FOA

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### **Geranium (Pelargonium, rose-scented)**

*Pelargonium capitatum* is one of several species grown for its essential oil. Pelargonium is grown in diverse areas in the world (e.g Reunion Islands, China and Egypt). The story of Pelargonium illustrates the importance of the selection of the correct plant species. There are at least five different species that are grown for their oils, each with different properties. For example, *P. graveolens* and *P. capitatum* are rose-scented and *P. tomentosum* is peppermint-scented. The most sought-after cultivar produces the so-called “Bourbon Oil”. This was thought to be a hybrid of *P. graveolens* but was later found to be a hybrid between *P. capitatum* and *P. radens*.

Geranium is one of the more important raw materials for the fragrances industry. The oil is used in perfumes, soaps and the like and provides a strong middle note.

The major markets for geranium oil are the US, France, Germany, Britain and Japan. France is a major re-exporter of geranium oil, which is often further, distilled and re-blended there to client specifications. World demand is difficult to assess and fluctuates widely. Annual worldwide production is reported to be over 500 tons per annum.

There are many types of geranium oil each with their own characteristics and prices. For example, in 2001, the prices were \$40.50/kg (Chinese), \$70.00/kg (Bourbon) and \$41.00/kg (Egyptian).

Geranium is grown quite widely in South Africa, but not without some difficulty. One large producer in Mpumalanga noted that he could only get the “Bourbon Oil” characteristics half the year due to harvesting conditions. The George Oil Project (sponsored by SAB) failed when it was unable to scale up to the projected 100 ha under cultivation and the yields were far lower than consultants advised.

As with all essential oils, production can be quite erratic, however South Africa is now a net exporter of Geranium oil. Most is exported to Britain and a major player in the South African market appears to be Biosys Plant Extracts (Pty) Limited and its client farmers.

Locally, Geranium oil fetches prices between R800/kg and R1 200/kg, depending on volume and quality. Geranium oil is one of the most widely produced essential oils in South Africa.

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**Table 14: South African Geranium Imports and Exports** <sup>42</sup>

<b>Year</b>	<b>Import (Kg)</b>	<b>Export (Kg)</b>
1999	634	12
2000	554	60
2001	464	800
2002	242	425
2003	612	3,912

### **Lavender/Lavandin**

There are three types of lavender commonly on the market:

- *Lavandula angustifolia* or true lavender (which fetches the highest price on world markets, but has a lower yield per hectare);
- *Lavandula spika* or spike lavender (which fetches a fair price but has a smaller market); and
- Lavandin which is a hybrid of the two (which has the lowest price on international markets, but gives the highest yields per hectare and is hardier).

The South African Customs & Excise figures combine Lavender and Lavandin.

The world production of high quality Lavender oil is estimated to be about 200 tons per annum. World production of Spike Lavender oil is estimated at 150 tons to 200 tons per annum. World production of Lavandin oil is estimated at about 1000 tons per annum.

The prices obtained for lavender oils vary widely based on quality and batch size. A good quality Lavender oil may sell for R1500/kg. Lavandin oil on the other hand sells for approximately R200/kg.

Success in Lavender oil depends on the correct genetic material. Linalool acetate and linalool are the key determinants, and there must be no camphor and only traces of cineol. Local varieties tend to be high in camphor, which is not acceptable on world markets.

Lavender oils are used in the fragrance, perfumery (giving a middle note) and aromatherapy industries. Lavender is used extensively in household cleaning products for the strong fresh fragrance.

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<sup>42</sup> SARS (Customs & Excise)

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Most Lavender oil is imported to South Africa from Britain or France (both countries having a long standing tradition in Lavender). The South African export figures include re-exports to other African countries (e.g. Kenya Malawi, Zimbabwe and Zambia). Genuine export of South African product is estimated as being in the region of 600kg per annum (some of which is re-imported from France and Britain in formulations).

**Table 15: South African Lavender and Lavandin Imports and Exports<sup>43</sup>**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	5,132	70
2000	14,470	556
2001	4,686	30
2002	7,110	287
2003	4,333	1,990

The price of Lavender can fluctuate tremendously, for example in 2000 10,250 kg of oil was imported from Australia at R14/kg when the average price for lavender from England and France, over the same period, was R170/kg. The average export price in 2003 of Lavender oil was R648/kg with the prices going over R2000/kg for exports to the Netherlands and Germany (both known for paying a premium for organically certified oils). However, the floor price for non-organic oil is generally accepted as R300/kg.

Estimated production for 2004 is 1200 kg and 3.700kg for 2005 (there are many young plantings). There is a significant amount of lavender being grown in the Cape and the Midlands of Kwa-Zulu Natal.

### **Jasmine**

Jasmine is used in perfumery, inclusive of household cleaning products. Jasmine gives a lingering base note.

Imports of Jasmine, although in small quantities, come from France or Britain. Jasmine will, generally, be imported in finished fragrance products and will not reflect on the essential oil statistics.

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<sup>43</sup> SARS (Customs & Excise)

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The Jasmine produced in South Africa is generally sold as an absolute (i.e. it has been produced by solvent extraction). Jasmine is very labour intensive and the petals are picked by hand at night to improve the quality of the oil. Yields are typically very low. One ton of petals produce roughly 1kg of absolute.

**Table 16: South African Jasmine Imports and Exports<sup>44</sup>**

<b>Year</b>	<b>Import (Kg)</b>	<b>Export (Kg)</b>
1999	98	45
2000	13	-
2001	7	2,311
2002	1	120
2003	-	3,274

The large exports of Jasmine in 2001 and 2003 were to France. This may well have been attributable to Robertet in Rustenberg. It is possible to stockpile essential oils as they have a long shelf-life, if kept under the right conditions.

Robertet of France took over Rollan Essential Oils in Rustenberg as one of its international subsidiaries. Robertet Aromatics produces (and contracts farmers to produce) Jasmine and Tagetes oils and extracts. All of the production is sent to France to be standardized and used in fragrances. Robertet is a family business now listed on the Paris bourse. It has an annual turnover of Euro 200 million and subsidiaries on five continents.

The export price of Jasmine over the period 1999 to 2003 ranged between R600-R650/kg.

### **Lemon grass**

There are two types of lemon grass: *Cymbopogon citrates* and *Cymbopogon flexuosus*. Lemon grass oil is well supplied by China, India, Sri Lanka and Madagascar. Nevertheless there is a good international market, but supplies must be consistent and have sufficient volume.

Lemon grass requires well drained soil, and sunny hot humid conditions and is grown in Mpumalanga. *C. citrates* grows better below 750 metres and *C. flexuosus* is better at higher

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<sup>44</sup> SARS (Customs & Excise)

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altitudes. The lower the altitude and more alkaline the soil, the higher is the citral content of the oil. The citrates variety is in demand if the citral content is high.

The South African production figures are not readily available. The price for lemon grass oil is R300/kg to R400/kg. Although it is a bulk oil, well supplied from the east, it is still grown locally because of its versatility in various applications, both as flavour and fragrance.

### **Chamomile (Roman and German)**

There are two types of Chamomile: Roman and German. German Chamomile is more highly sought after and has a blue hue as a result of its Azulene content.

Very little Chamomile is produced in South Africa ((estimated at about 30kg to 40kg per annum). The world market is also very small at an estimated 20 tons per annum. However, it is a highly profitable crop and there are community programs in the Eastern Cape that are scheduled to produce German Chamomile within the next two years. There are also large plantations in Lesotho that are currently exporting between 300kg to 400kg per annum directly to the international market.

Depending on the type and whether it is organically certified or not, Roman Chamomile prices range from R1500/kg to R3000/kg and German Chamomile from R5000/kg to R10,000/kg.

The University of the North-West (formerly Potchefstroom University) has a project involving the supercritical extraction of Roman and German Chamomile oils. This improves the quality of the oils.

### **Peppermint**

Peppermint (*Mentha piperita*) is used primarily in beverages and confectionaries and in personal hygiene products, such toothpaste. These are staples; hence the reasonably steady rate of imports year on year. The largest producer of peppermint oils world wide is the United States (production is highly mechanized). Peppermint can only be grown at certain latitudes (which would limit production, in South Africa, to the Southern Cape).

South Africa imports over 90% of its requirements from the US and Britain. The price of peppermint oil has been reasonably stable over the five year period (1999 to 2003). Peppermint is sold locally at between R90/kg and R120/kg. The product is a commodity and the market is mature. Mint formulations are strictly adhered to and as a consequence most

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mint imports are already formulated by the parent company (be they a flavour or fragrance house or a producer of consumer products).

Production in South Africa is limited, with the exact quantities unknown. There are no exports to speak of as the exports from South Africa are mainly re-exports into Africa, including Kenya and Zambia but predominantly Zimbabwe. Most local production will be sold into the local aromatherapy market.

**Table 17: South African Peppermint Imports and Exports<sup>45</sup>**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	52,330	1599
2000	50,332	2390
2001	47,188	1,052
2002	42,630	1,468
2003	53,530	2,636

The University of the North-West (formerly Potchefstroom University) has a project involving the supercritical extraction of peppermint oil. This improves the quality of the oils.

### **Other mint**

The largest of the other mints appears to be spearmint (*Mentha Spicata*). In general spearmint is used in confectionaries and in personal hygiene products like toothpaste. Spearmint is also a staple; hence the reasonably steady rate of imports year on year. The largest producer of mint-related oils is the USA (Northwest) and Canada. The mints market is mature and formulations are strictly adhered to. As a consequence most mint imports are already formulated.

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<sup>45</sup> SARS (Customs & Excise)

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**Table 18: Other mint Oil Imports and Exports**

<b>Year</b>	<b>Import (kg)</b>	<b>Export (kg)</b>
1999	21,283	233
2000	26,208	477
2001	40,815	1,484
2002	29,155	148
2003	24,954	958

The exports from South Africa mostly constitute re-export sales to Zimbabwe.

Although still commodities, other mints tend to fetch, on average, a higher price than peppermint (between R150 and R250/kg over the period 1999 to 2003).

### **Rosemary**

Rosemary is grown extensively, but a large proportion of the product is sold fresh or dried. It is estimated that producers of Rosemary oil in the Cape are producing 400 to 500kg per annum. There are a few producers in the Gauteng area. The bulk price for Rosemary oil is approximately R300/kg.

### **Tagetes**

Khakibush (*Tagetes minuta*) is a South American plant that is now endemic in many parts of the world, including most of South Africa. The general consensus is that Khakibush is easy to grow. The crux is to successfully distill the oil and to have a market. The essential oil (commercially known as Tagetes or Tagets) is used in perfumery and as a flavourant in food, beverages and tobacco. It has unique compounds and there is no suitable substitute for true Tagetes oil.

The world market for Tagetes is estimated at between 8 to 11 tons per annum. Zimbabwe use to be a large producer, but now South Africa is taking up the slack. It is estimated that South Africa produces some 6 to 7 tons per annum.

The current price of Tagetes (April 2004) is between R400/kg and R700/kg, although prices as high as R1000/kg are being asked locally (which is considered by some in the industry as being too high). There is a view that there is an oversupply of Tagetes and this is driving down the market prices. Some committed producers argue that there are large variations in

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quality and this affects pricing, explaining that satisfied customers are willing to pay the higher prices for sustainable volumes and quality.

### **Buchu**

Buchu is a perennial shrub with woody branches. There are several varieties of Buchu the most well-known of which are the *Agothosma betulina* and *Agothosma crenulata*. The round-leaf Buchu (*A. betulina*) is the most used for essential oil. Buchu is restricted to South Africa and is a typical component of the Cape Fynbos. Buchu is both wild-harvested and cultivated in the Cape. Attempts have been, and are being, made to grow Buchu elsewhere (for example Australia). However, it is difficult to cultivate wild plants outside of the natural habitat, for example, attempts to grow Buchu in Mpumalanga have shown that Buchu is susceptible to fungus.

Buchu has been used for medicinal and cosmetic purposes for centuries. More recently it is sought after for its application in the food industry. Round-leaf Buchu contains valuable essential oil rich in isomenthone and diosphenols. It also contains sulphur compounds that give it a characteristic black-current smell and flavour.<sup>46</sup> The oil is also used in perfumes and colognes for fruity notes.

The South African Buchu industry has had mixed fortunes in the past and is considered to be in danger of substitution once again unless the prices drop. In the last century, it was much in demand in Europe until the 1960's onset of the synthetic flavour market. Cheaper, easier synthetic options pushed Buchu off the international map, and it was only in the late 1980s and 1990s, with Germany's burgeoning consumer interest in things 'natural', that Buchu made its current comeback. The exports of Buchu both of oil and dried product amounted to R20 million in 2000<sup>47</sup>. Dr Cobus Coetsee, formerly of the Agricultural Research Council (ARC), estimates that the world market is potentially worth R100 million. Ninety per cent of product is exported. The majority of this is exported to Germany, which pays a premium for "natural" product. The current price of Buchu oil is between R7,000/kg and R15,000/kg, depending on its quality. This is about twice the price of some of the more expensive essential oils like German Chamomile. The price is driven by scarcity of supply and the continued high demand. However, it is generally held view that the price of Buchu is too high and that this will undermine the market by forcing users to turn to substitutes.

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<sup>46</sup> Prof Ben-Erik van Wyk, "Medicinal Plants of South Africa"

<sup>47</sup> Wesgro

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Organizations, such as Cape Nature Conservation, are involved in community based projects involving commercial cultivation of Buchu, which projects will increase cultivation thus increasing supply and reducing the price. This may assist with the creation of a sustainable industry.

Afriflex in the Cape, an innovative food technology company, is using super critical extraction methods to beneficiate Buchu oils (amongst others).

### **Artemesia**

African Wormwood (*Artemesia Afra*) is an erect shrub with highly aromatic feathery leaves. It occurs over large parts of the eastern half of southern Africa and northwards to tropical east Africa and Ethiopia. The plant is rich in essential oils, but these vary from region to region with remarkable variety in their composition.<sup>48</sup> The effect of this is that careful selection of plant material is required in order to get the required chemical profile.

It is estimated that local production is between 500 and 800 kg per annum and the price varies between R200/kg to R300/kg. Most of the production is cultivated but some wild harvesting still continues. Zimbabwe was a larger producer of Artemesia, but this production has been disrupted.

The University of the North-West (formerly Potchefstroom University) has a project involving the supercritical extraction of Artemesia oils. This improves the quality of the oils.

### **Other indigenous essential oils**

There are many initiatives aimed at producing novel indigenous essential oils. These include the Cape Chamomile (*Eriocephalus punctulatus*) and Cape Snowbush (*Eriocephalus africanus*). However these are very small enterprises located mostly in the Cape, where they take advantage of the uniqueness of the Cape Fynbos. Essential oils produced in this way are exported in very small quantities (a few kilograms per annum) to specialty/novelty buyers in USA and Europe. These oils are sold for between R2600/kg to R3900/kg.

The large traditional buyers of oils are generally not interested in novelty oils as they have no mass market application. This creates a “chicken and egg” situation. It is not economic to step-up production without a market and there is no market without significant volumes of production and market acceptance. One way of overcoming this, in the long-term, is to develop a local industry capable and interested in beneficiating its own oils. This would

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<sup>48</sup> Prof Ben-Erik van Wyk, “Medicinal Plants of South Africa”

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increase levels of off-take, help generate standards and accepted usage. There is a clear argument to be made that if South Africa and South Africans do not use their own indigenous materials for the production of commercial products then there is no reason to expect foreigners to do so.

### **Other Unique South African Plant Products sold in large quantities**

Along with Buchu, there are other indigenous plants that are traded extensively on the international market (i.e. volumes measured in tons). These include teas such as Rooibos and Honeybush and extracts such as Aloe gels from the Cape Aloe Ferox. These are also large markets and are qualitatively different from the products referred to so far. However, only Buchu produces an essential oil used in the flavour and fragrance industry. Together with rooibos and honeybush tea, buchu is one of three South African medicinal plants used in international medicine and is recognised by the British Pharmacopoeia Martingdales.

**Table 19: Unique South African Best Sellers** <sup>49</sup>

<b>Product</b>	<b>Volume (t)</b>	<b>Value (R mil)</b>
Rooibos	6000	60
Honeybush	150	1
Buchu	150	20
Aloe Ferox	400	6
<b>TOTAL</b>	<b>6300 tonnes</b>	<b>87</b>

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<sup>49</sup> Source: Wesgro 2000